

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
13 February 2003 (13.02.2003)

PCT

(10) International Publication Number
WO 03/012119 A3

- (51) International Patent Classification: C12Q 1/68 (81) Designated States (*national*): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (21) International Application Number: PCT/SE02/01378
- (22) International Filing Date: 12 July 2002 (12.07.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 0118959.6 3 August 2001 (03.08.2001) GB
- (71) Applicants (*for all designated States except US*): BIO-CYCLICA AB [SE/SE]; Strandvägen 48, S-193 30 Sigtuna (SE). LANDEGREN Gene Technology AB [SE/SE]; Rudbeck Laboratory, S-751 85 UPPSALA (SE).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): LANDEGREN, Ulf [SE/SE]; Norra Parkvägen 29, S-756 45 Uppsala (SE). GULLBERG, Mats [SE/SE]; Glimmervägen 11B, S-752 41 Uppsala (SE). NILSSON, Mats [SE/SE]; Strandvägen 48, S-193 30 Sigtuna (SE).
- (74) Agents: DR LUDWIG BRANN PATENTBYRÅ AB et al.; Box 1344, S-751 43 Uppsala (SE).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(88) Date of publication of the international search report:
13 November 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 03/012119 A3

(54) Title: NUCLEIC ACID AMPLIFICATION METHOD

(57) Abstract: A nucleic acid amplification method, and probes for use within the method are described.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 02/01378

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: C12Q 1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Nature Genetics, Volume 19, 1998, Paul M. Lizardi et al: "Mutation detection and single-molecule counting using isothermal rolling-circle amplification", pages 225- 231, figure 6 --	1-3,5,8,10, 12,28-34
X	US 5854033 A (LIZARDI), 29 December 1998 (29.12.98), column 11, line 45 - line 64 --	1-3,5,8,10, 12,28-34
X	WO 0188190 A2 (MOLECULAR STAGING, INC.), 22 November 2001 (22.11.01), claim 31 --	1-3,5,8,10, 12,28-34

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"B" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

20 January 2003

22-01-2003

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Patrick Andersson/EB
Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

BEST AVAILABLE COPY

Copied from 10718238 on 05/24/2006

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/01378

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0006778 A1 (THE PUBLIC HEALTH RESEARCH INSTITUTE OF THE CITY OF THE NEW YORK, INC.), 10 February 2000 (10.02.00), claims 19,23,33 --	1-3,5,8,10, 12,28-34
A	US 6221603 B1 (MAHTANI), 24 April 2001 (24.04.01) -- -----	1-3,5,8,10, 12,28-34

Form PCT/ISA/210 (continuation of second sheet) (July 1998)

BEST AVAILABLE COPY

Copied from 10718238 on 05/24/2006

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE02/01378

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
see next sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1998)

BEST AVAILABLE COPY

Copied from 10718238 on 05/24/2006

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE02/01378

This international Searching Authority found multiple inventions in this international application, as follows:

1. Claim 1a completely and parts of claims 2-3, 5, 8, 10, 12 and 28-34, a method of analysing circularised nucleic acid by directly detecting concatemeric amplification product of said nucleic acid.
2. Claims 1b and 13-27 completely and parts of claims 2-3, 5, 8, 10, 12, and 28-34, a method of analysing circularised nucleic acid by carrying out a further signal generating reaction on a concatemeric amplification product of said nucleic acid. Said invention may at a further search be found to relate to two separate inventive concepts.
3. Claims 1c, 4, 6-7, 9, 11 completely and parts of claims 2-3, 5, 8, 10, 12, and 28-34, a method of analysing circularised nucleic acid by monomerising a concatemeric amplification product of said nucleic acid before analysing said product.

According to Article 34(3)(a-c) and Rule 13.2, an international application shall relate to one invention only or to a group of inventions linked by one or more of the same or corresponding "special technical features", i.e. features that define a contribution which each of the inventions makes over the prior art.

Direct detection of concatemeric amplification product of circularised nucleic acid is known in the art, see e.g. US5854033. Consequently, analysis of circularised nucleic acid by concatemeric amplification of said nucleic acid is known in the art, no other technical feature unifying the three invention have been found.

Invention 1 has been searched.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 02/01378

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5854033 A	29/12/98	AT 199572 T	15/03/01
		AU 714486 B	06/01/00
		AU 1024097 A	11/06/97
		DE 69612013 D,T	02/08/01
		DK 862656 T	09/04/01
		EP 0862656 A,B	09/09/98
		SE 0862656 T3	
		JP 2002503948 T	05/02/02
		US 6143495 A	07/11/00
		US 6183960 B	06/02/01
		US 6210884 B	03/04/01
		US 6329150 B	11/12/01
		US 6344329 B	05/02/02
		WO 9719193 A	29/05/97
WO 0188190 A2	22/11/01	AU 5332800 A	26/11/01
		US 6291187 B	18/09/01
WO 0006778 A1	10/02/00	AU 5240299 A	21/02/00
		CA 2336489 A	10/02/00
		EP 1100971 A	23/05/01
		JP 2002521069 T	16/07/02
		US 6037130 A	14/03/00
US 6221603 B1	24/04/01	AU 3476001 A	14/08/01
		EP 1252334 A	30/10/02
		NO 0157256 A	09/08/01

Form PCT/ISA/210 (patent family annex) (July 1998)

BEST AVAILABLE COPY